S5-denying Approach to Relativized Metaphysical Modality

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Abstract: This paper is organised as follows: first, I present Salmon's theory of modality (which I call 'S5-denying approach to relativized metaphysical modality') and compare it with the standard interpretation of modality: 'the non-relativized S5-friendly interpretation of metaphysical modality'. Second, I explain Murray and Wilson's 'two-dimensional S5-friendly interpretation of relativized metaphysical modality'. In the third and last part, I put forward a few arguments against Murray and Wilson's attempt to provide an essentialist S5-friendly theory for modality. In general, this paper argues that if one wants to hold an essentialist theory for relativized (metaphysical) modality, then his best

option in the market right now is to stick with Salmon's proposal, which better represents a genuine essentialist interpretation of relativized metaphysical modality.

1 Introduction

Nathan Salmon (1989) argued (following Hugh Chandler (1976)) that things that are *possible* may be merely *contingently possible* instead of *necessarily possible*. Employing the possible worlds vocabulary, the claim is that what is *possible* may *vary* depending on which possible world is being taken into consideration. According to the relativist treatment of modality, it is natural to suppose that some things that are impossible from the standpoint of a possible world w_1 are possible from the perspective of a different possible world w_2. That is equivalent to say that things which qualify as viable possibilities from a possible world w_1 might be different from the viable possibilities from a possible world w_2. In this sense, possibilities (and also necessities) are *relativized* to which possible world is being taken into consideration. Although Salmon's suggestion might be interesting and capable of dealing with some intricate philosophical problems, it has been underappreciated in literature probably due (I speculate) to its dismissal of features of modal logic regarding which significant consensus has been reached. The consensus concerns the idea according to which the logic for *metaphysical modality* should not be weaker than the **S5** modal logic system. The idea is that an adequate theory for metaphysical modality requires models in which the *accessibility relation* between possible worlds is an *equivalence relation*. Since Salmon's semantics puts to use an accessibility relation between possible worlds weaker than equivalence (*intransitive*) (therefore, the consensus is not fulfilled), philosophers

may have found themselves dissuaded to take Salmon's modal theory as seriously as it deserved. However, more recently, Adam Murray and Jessica Wilson (2012) took Salmon's central insights seriously and proposed an interpretation of it which, if successful, can eventually deliver the benefits of a relativized description of metaphysical modality without having to pay the price of dropping **S5**. Hence, if they successfully achieve their goal, then they will be able to provide an *essentialist* S5-friendly theory for relativized metaphysical modality. Unfortunately, however, I shall argue that they do not achieve their goal; therefore, if I am right, no essentialist S5-friendly theory for relativized metaphysical modality is available.[1]

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[1] 'Modal logic' is used here to refer to what is known as 'normal modal logic': extensions of classical propositional logic by the addition of two elements i) the axiom K $\Box(\phi \to \psi) \to (\Box\phi \to \Box\psi)$ and ii) the necessitation rule; if ϕ is a theorem of **K**, then $\Box\phi$ is also a theorem of **K**. As a result of the addition of i) and ii) to classical logic, we have the simplest and weakest modal system **K**. The modal system **T** is reached by adding $\Box$T $\ulcorner\Box\phi \to \phi\urcorner$ (or $\Diamond$T $\ulcorner\phi \to \Diamond\phi\urcorner$) to system **K**. **B** is reached by adding $\Box$B $\ulcorner\phi \to \Box\Diamond\phi\urcorner$ (or $\Diamond$B $\ulcorner\Diamond\Box\phi \to \phi\urcorner$) to **T**. By adding $\Box$4 $\ulcorner\Box\phi \to \Box\Box\phi\urcorner$ (or $\Diamond$4 $\ulcorner\Diamond\Diamond\phi \to \Diamond\phi\urcorner$) to **T**, we get **S4**. And, finally, the addition of $\Box$5 $\ulcorner\Diamond\phi \to \Box\Diamond\phi\urcorner$ (or $\Diamond$5 $\ulcorner\Diamond\Box\phi \to \Box\phi\urcorner$) to **T** gives us **S5**. Each of these systems is proven to be *sound* and *complete* relative to its respective semantics. From the semantic point of view, the systems differentiate by constraints on *accessibility relation* between possible worlds. The accessibility relation is a binary relation on the set of possible worlds. Intuitively, a possible world w holds accessibility relation with a possible world w' *iff* w' is possible relative to (is "accessible" from) w. In the case of the semantics for **T**, the accessibility relation is characterised as *reflexive*. Regarding **B**, a *reflexive* and *symmetrical* semantics is needed. Concerning **S4**, a *reflexive* and *transitive* semantics is required. And for **S5** a *reflexive*, *symmetrical* and *transitive* semantics is necessary. Some interesting logical relations among the systems can be shown. **S5** is the strongest modal system (any theorem of a weaker system, such as **S4**, is also an S5-theorem, but there are S5-theorems which are not S4-theorems. And **B** and **S4** are independent and alternative systems and both entail **T**. From

This paper is organised as follows: firstly, I present Salmon's theory of modality (which I call 'S5-denying approach' short for 'S5-denying approach to relativized metaphysical modality') and compare it with the standard interpretation of modality; 'the non-relativized S5-friendly interpretation of metaphysical modality'. Secondly, I explain Murray and Wilson's 'two dimensional S5-friendly interpretation of relativized metaphysical modality' or '2D-interpretation' (I focus on only one of its implementations: the one with non-overlapping subspaces). Thirdly and most importantly, I put forward a few arguments against Murray and Wilson's attempt to provide an essentialist S5-friendly theory for relativized metaphysical modality. As might be clear up to now, this paper can be read as an indirect defence of Salmon's account of relativized metaphysical modality. Since it argues that if one wants to hold an essentialist theory for relativized metaphysical modality, then his best option in the market right now is to stick with Salmon's proposal, which (I shall argue) better represents a genuine essentialist interpretation of *relativized metaphysical modality*.

2 Standard Interpretation vs. S5-denying Approach

This section explains both the *standard interpretation* of modality and Salmon's S5-*denying approach*. As I said above, Salmon's theory of modality can be understood as a restriction on the standard interpretation. The standard interpretation is what I have been calling 'non-relativized S5-friendly interpretation', while Salmon's theory I call 'the S5-denying approach to relativized metaphysical modality'. These labels suggest

a philosophical standpoint, it is also worth noting that it is a widespread consensus that the logic for metaphysical modality should be somewhere between **T** and **S5**.

the differences between the two approaches: according to Salmon's interpretation, metaphysical modality is to be understood in a relativized way. As a result, the **S5** modal logic system is regarded as too strong. According to the standard interpretation, metaphysical modality behaves in a non-relativized manner, which means that **S5** modal logic system is exactly as strong as it should be. These explanations are supposed to justify the use of the aforementioned labels, but the exact difference between them may not be clear yet. Hopefully, this section will bring to light all the differences and similarities between them.

Metaphysical modality has usually been understood in a non-relativized fashion, which means that what is possible (or necessary) is possible (or necessary) *no matter what*. Using possible worlds discourse, what is possible (or necessary) relative to *one* possible world is possible (or necessary) for *any* other possible world. According to the non-relativized interpretation, any possible world is possible relatively to every possible world. Similarly, if a proposition p is possible at world w_0 (p is true in some possible world accessible from (possible relative to) w_0), then p is possible relative to any possible world or, equivalently, p is necessarily possible. If that is true, then the **S5** modal logic system has to be assumed when we are working on the metaphysics of modality. Looking closer, we will see that the non-relativized interpretation is supporting the following general modal principle:

> **MP5**   If ϕ is possible, then ϕ is necessarily possible.

The role of MP5 is played in modal logic by the characteristic axiom of **S5** $\ulcorner \Diamond \phi \rightarrow \Box \Diamond \phi \urcorner$. Interestingly, we do not have a direct and definitive argument defending MP5. Philosophers seem to take it as plausible and start to work presupposing it without arguing in

its defence. The following argument by Plantinga is an exception in this regard:

> "Suppose we focus our attention on *broadly logical necessity*. Are there propositions that are in fact necessary, but would have been merely contingent if things had been different, if some other possible state of affairs had been actual? (13) All bachelors are unmarried and (14) If all bachelors are unmarried and Dirk is a bachelor, then Dirk is unmarried are necessary truths; could they have been merely contingent? If so, there must be some possible state of affairs S such that if S had been actual, then (13) and/or (14) would have been contingent. But are there states of affairs that with any show of plausibility could be said to meet this condition? [...] I think we can see that (13) and (14) are not merely necessary; they could not have been contingent. [...] Are there propositions that in fact are possible, but would have been impossible had things been different in some way? (15) Socrates never married and (16) Socrates was a carpenter are false but possible propositions; could they have been impossible? The answer, I think, is clear; (15) and (16) themselves could not have been impossible." (Plantinga, 1974, pp. 52-53)

One first point about Plantinga's argument is to think about what exactly he means by 'broadly logical necessity'. It is not obvious what he means by that. It is not clear whether 'broadly logical necessity' means the same as 'metaphysical necessity' or something else such as 'conceptual necessity' or 'analytical necessity', for instance. Even though one may want to equate

'broadly logical necessity' with 'metaphysical necessity', these expressions do not mean the same thing. One piece of evidence in this direction is Chandler's article 'Plantinga and the Contingently Possible', where he tries to make the point that there must be at least some metaphysical necessities only necessary relative to some possible worlds but not to all of them. And as we have seen, Plantinga's argument defends the idea that broadly logical necessity does not vary from one state of affair (possible world) to another. Being that the case, if a proposition p is necessary in one state of affair, then p will also be necessary in any other state of affair. Consequently, Plantinga's argument can be understood a defence of MP5, at least with concern to the broadly logical modality. I will not dive any deeper into this discussion here because it would lead to problems which are beyond the scope of this paper. It was worth mentioning, though, since, as Salmon pointed out, Chandler's paper is the source of the idea which I am calling (following (Murray & Wilson, 2012)) 'relativized metaphysical modality'.

One different source of motivation for accepting the standard interpretation of modality is the widespread idea according to which metaphysical modality is the *broadest kind of alethic modality*. As Burgess puts it and Murray and Wilson (2012) quote:

> "[W]e may distinguish the species of *physical* necessity, or what could not have been otherwise so long as the laws of nature remained the same, from *metaphysical* necessity, what could not have been otherwise no matter what." (Murray & Wilson, 2012, p. 189)

The suggestion that metaphysical necessity corresponds to what could not have been otherwise *no matter what* seems to be an additional motivation towards the standard interpretation of metaphysical modality.

> "Very few metaphysicians have rejected the
> B axiom for metaphysical modality. If some-
> thing is so, how could it have been meta-
> physically impossible? Indeed, most meta-
> physicians accept S5 as the propositional
> modal logic of metaphysical modality, but
> in any case the most prominent objections
> to S5 in that role target the principle that
> whatever is necessary is necessarily neces-
> sary [or equivalently, whatever is possibly
> possible is possible] rather than the B prin-
> ciple." (Williamson, 2013, pp. 43-44)

The aim of this paper is not to argue against **B** or **S5**.[2]
In fact, what I am trying to do is to defend a specific
interpretation of modality supposing that we have in-
dependent reasons to accept a relativized interpreta-
tion of modality. Once one has accepted relativized
metaphysical modality, the most straightforward way
to deal with it is to assume a modal logic to a sys-
tem weaker than **S5**. Following the path indicated by
Williamson, what I am going to do is to present an
objection to **S4** that is usually taken as motivating
a relativized understanding of metaphysical modality.
But before going into that, I still have to explain the
standard or non-relativized interpretation of modality.

One quite direct way to explain the standard in-
terpretation is talking about the modal principles en-
coded in the axioms of the modal logic systems. We
can speak of two pairs of modal principles that are part
of the standard interpretation and will differ from the
relativized one: first, the modal principle which states
that i) what is possible is necessarily possible. ii) what
is possibly necessary is necessary. Given i), ii) follows
a theorem (and vice-versa). And, second, the modal

[2]Nathan Salmon suggests a kind of agnosticism or scepticism
regarding **B**, but he does not offer a counterexample to it. (1989,
pp. 25-29)

principle which states that iii) what is possibly possible is possible. iv) what is necessary is necessarily necessary. Given iii), iv) follows as a theorem (and vice-versa). Any of the of principles of the first pair correspond precisely to the axioms that should be added to the system **T** of modal logic to get **S5**. And the second pair corresponds precisely to the axioms that should be added to the system **T** to get **S4**. The system **S5** includes **S4**, in the sense that all theorems of **S4** are theorems of **S5**. Therefore, rejecting any of the modal principles implies the rejection of **S5**: directly, by rejecting either i) or ii); indirectly, by rejecting either iii) or iv).

The application of these modal principles to *metaphysical modality* results in the following: i) if something is a *metaphysical* possibility, then it is necessarily a *metaphysical* possibility. And iii) if something is possibly a *metaphysical* possibility, then it is a *metaphysical* possibility. Put as a slogan, all metaphysical possibilities are metaphysical possibilities in *any situation*. The set of metaphysical possibilities is the same in any case. Denying any of these ideas is the same as accepting some version of *a* relativized metaphysical modality. It might still not clear what exactly the differences between the standard interpretation of metaphysical modality and the relativized one are. From this point onwards, our best bet to make things clearer is to appeal to Possible Worlds Semantics (PwS). Possible worlds semantics is likely to help us to make intuitive sense of the differences that we wish to establish. Possible worlds semantics is often used to understand modality, and it indeed helps us make sense of the axiomatization of modal logic mainly when we need to understand better the iteration of modal operators.

Possible world semantics for propositional modal logic might be roughly speaking presented as a triple $\langle W, R, v \rangle$, where W stands for a non-empty *set* of pos-

sible worlds, R represents the *accessibility relation* that ranges over W, and v is a *function* which assigns truth values to each sentential variable regarding each possible world. A definition for necessity operator, then, is what follows:

$v(\Box p, w) = $ T *iff* for *every* world w' in W such that wRw', $v(p, w') = $ T.

For the standard interpretation of modality, the clauses for the truth of modal claims can be simplified. Since every possible world is accessible (possible relative) to every possible world, the binary relation (the accessibility relation) does not need to be mentioned. So, the following clauses for the modal operators are good enough:

$v(\Box p, w) = $ T *iff* for *every* world w' in W, $v(p, w') = $ T.

$v(\Diamond p, w) = $ T *iff* for *some* world w' in W, $v(p, w') = $ T.

If we grant that modal claims should be somehow relativized, then the clauses just given are no longer enough. However, the possible world semantics gives us a quite straightforward way to make room for an adequate interpretation of the relativized modality. All we need to do is to take advantage of the tools available in the standard semantics. In this case, the binary relation of accessibility between possible worlds will allow us to interpret the relativized modality properly. The clauses for the truth of modal claims that make room for relativized modality are the following:

$v(\Box p, w) = $ T *iff* for *every* world w' in W such that wRw', $v(p, w') = $ T.

$v(\Diamond p, w) = $ T *iff* for *some* world w' in W such that wRw', $v(p, w') = $ T.

For the truth of necessity claims regarding a specific possible world w, only one subset of the set of possible worlds, rather than the whole universe of them, will be relevant, but which is the relevant one? Only the one including the possible worlds accessible from w. The very same idea, of course, applies for the evaluation of possibility claims.

The standard interpretation of modality understands the accessibility relation between possible worlds as an *equivalence* relation. As I understand it, strictly speaking, any theory that employs a notion of metaphysical modality that can be modelled by a semantics in which the accessibility relation between possible worlds is *weaker* than an equivalence relation should be understood as a relativized theory of modality. Having as framework the semantics for normal modal logic, we have a few alternatives, we can, for instance, either reject the *symmetry* or the *transitivity* or even the *reflexivity* of the accessibility relation between possible worlds. No matter which direction one decides to go, one will be supporting what I understand as a *relativized modality*. Since it is not easy to motivate the rejection of symmetry of the accessibility relation between possible worlds and, regarding metaphysical modality, reflexivity has not risen any suspicious so far (it is quite plausible to suppose that it should be at least reflexive), the best available option is to show that the accessibility relation is *intransitive*. Salmon's idea was to follow that path presenting what he thinks to be a counterexample to transitivity. Before moving on to Salmon's counterexample, let us take a look at a diagram which is going to help to understand the approaches. The following PwS-diagram represents the standard interpretation of non-relativized metaphysical modality:
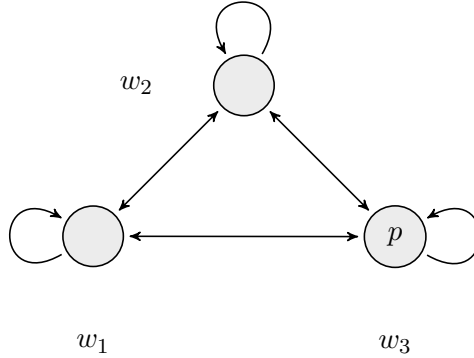
Figure 1: Standard interpretation of non-relativized metaphysical modality. The accessibility relation is *transitive*, *symmetrical* and *reflexive*. Once p is true in w_3, p is possible to every possible world. Therefore, p is necessarily possible (as it supposed to be in **S5**).

This diagram helps us to visualise the standard interpretation of metaphysical modality. As can be seen, the accessibility relation between possible worlds (indicated by the direction of the arrows) is reflexive, transitive and symmetrical. Therefore, a proposition possibly possible p is true$_{w1}$ *iff* p is true in at least one the possible world accessible from w_1 (w_1, w_2 or w_3). Since, all possible worlds "access" all other possible worlds, the very thing that makes the iterated proposition possibly possible p true [p being true either in w_1 or w_2 or w_3] makes possibly p true as well. All we need in order to both of them to be true is the proposition p to be true in w_3 even if it is false in w_1 and w_2. The very same scenario that makes possibly possible p true also makes possibly p true. Strictly, what validates the inference from possibly possible p to possibly p is the transitivity of the accessibility relationship between possible worlds [since w_1 accesses w_2 and w_2 accesses w_3, w_1 accesses w_3].

Salmon's strategy is to show that some inferences of the kind that requires *transitivity* are fallacious. How does he argue against transitivity? In order to motivate his idea, he appeals to an *essentialist* intuition about the material *origin* of an artefact; a wooden table, which he calls 'Woody'.

> "The case against S4 modal logic [transitivity of accessibility relation] stems from the intuition (which many of my opponents share) that a particular material artefact — say, a particular wooden table which we may call 'Woody' — could have originated from matter slightly different from its actual original matter m (while retaining its numerical identity, or its *haecceity*) but not from entirely different matter." (Salmon, 1989, p. 130)

From these modal intuitions, we can formulate a version of Salmon's argument with the following structure:[3]

1. Woody originates from matter m.

2. It is possible that Woody originates from matter m'.

3. It is not possible that Woody originates from matter m''.

4. If Woody had originated from matter m', then it would have been possible for Woody to originate from matter m''.

5. It is possibly possible that Woody originates from matter m''. (2, 4)

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[3]Salmon's version can be found at (Salmon, 1989, pp. 130-131). Murray and Wilson's can be found at (Murray & Wilson, 2012, p. 193).

6. It is not possible that Woody originates from m'', but it is possibly possible that Woody originates from matter m''. (3, 5)

7. It is not true that if it is *possibly possible* that Woody originates from matter m'', then it is *possible* that Woody originates form matter m''.

As we can see, the conclusion of the argument is supposed to be a counterexample to the **S4** modal logic system, which states that if something is possibly possible, then it is possible. The conclusion of the argument says that although it is possibly possible for Woody originates from matter m'', it is not possible for Woody originates from m''. In this case, there is no possible world directly accessible to the actual world in which Woody originates from m''. That model requires the accessibility relation between possible worlds to be intransitive, which means that "S4 modal logic is fallacious". (Salmon, 1989, p. 131). The following PwS-diagram represents Salmon's modal structure (the S5-denying approach to relativized metaphysical modality):
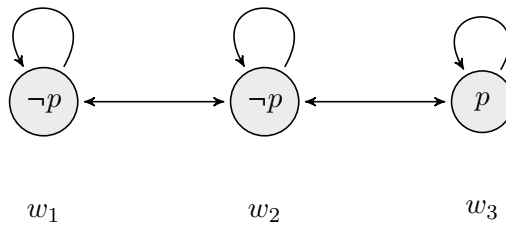

Figure 2: S5-denying approach: intransitive accessibility relation. Let p stand for: Woody originates from m''. According to this intransitive model, since w_3 is not accessible from w_1, p being true in w_3 does not make $\Diamond p$ true in w_1. Therefore, even though $v(\Diamond \Diamond p, w_1) = V$, $v(\Diamond p, w_1) = F$.

As can be noticed at Figure 2, the accessibility relation between possible worlds is reflexive and also symmetric. However, it is not transitive. Supposing that Woody originates from m in w_1, the intransitive model makes room for the proposition that it is *possible* that it is *possible* to Woody originates from m'' to be true, even though the proposition that it is *possible* that Woody originates from m'' is not true. In other words, the possible world w_3 (where Woody originates from m'') is not possible from w_1 but merely possibly possible. One key feature of Salmon's idea is that w_3 is still possible from w_2 where Woody originates from m', what is shown in the following counterfactual conditional: if Woody had originated from m', it would have been possible for Woody to originate from m''. that Salmon accepts the conditional.[4]

3 Two-dimensional Interpretation

Once we have got a clear understanding of the differences between the standard interpretation of modality and the S5-denying approach, we can now move on straight to the two-dimensional S5-friendly interpretation of relativized modality. To explain Murray and Wilson's approach, we can start by asking for the motivations to their proposal. What are precisely the reasons to reject both the standard interpretation of modality and the S5-denying approach? As we have seen, they want to make room for a sort of relativized interpretation of modality inspired by Salmon's argument concerning Woody. And, at the same time, they want to keep the **S5** modal logic system as the pattern for modal metaphysics; neither S5-denying approach

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[4]Murray and Wilson have provided an alternative interpretation of this conditional that avoids what they call '*in situ* shifts', which, according to them, is one of the main sources of their concerns with Salmon's proposal. (Murray & Wilson, 2012, p. 197)

nor the standard interpretation can meet these goals.

> We motivate the alternative proposal by attention to discussions in Salmon (1989) [...]. In [this] discussion, the author canvasses data which he takes to support a certain thesis—that the transitivity of the accessibility relation between possible worlds, and associated systems of modal logic S4 and S5, should be rejected as characteristic of metaphysical modality. We argue that the data [about Woody] can be accommodated, compatible with transitive accessibility [...], if metaphysical necessities and possibilities are relativized to *indicative actualities*. (Murray & Wilson, 2012, p. 190)

As they make clear, their primary motivation is to provide a theory capable of accommodating Woody's data (what S5-denying account also can do) in a system in which the accessibility relationship between possible worlds is an *equivalence* relation (as it is in the standard interpretation). In order achieve that goal, they provide a description in which the semantic structure is *relativized* to which possible world is considered as *indicatively actual*. Following that path, they end up adding a new parameter to the standard possible world semantics for modal logic. Although Murray and Wilson and myself may be using the term 'relativized' to apprehend, let us say, the same *metaphysical phenomenon*, the way how each of us implements the idea in the formal semantics is quite different. For me (following Salmon), it concerns the restriction on the accessibility relation between possible worlds; what is enough to make room for being *possible* (or *impossible*) to be *relative*. According to their understanding, a new parameter needs to be added to the standard semantics of modal logic to work as a function from *indicatively actual* worlds to *truth values*. Strictly speaking, their

implementation is a kind of *two-dimensional seman-tics*, which they acknowledge by saying that their theory is "formally *analogous* epistemic interpretation of the two-dimensional 2D semantic framework." (2012, p. 198). So, it might be a good idea to keep that in mind to help us to grasp their theory correctly. In what follows I will explain how it works, but for now I just wanted to highlight a potential difference in meaning concerning the use of the term 'relativized'. The following complex PwS-diagram gives us a grasp of their proposal:
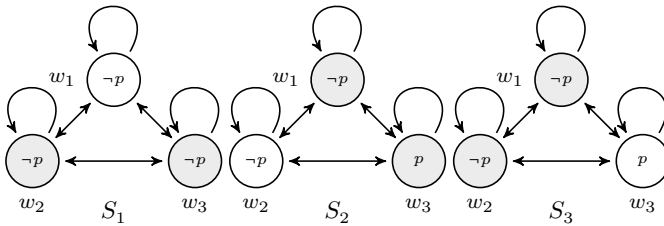

Figure 3: Two-dimensional strategy. There are three distinct isolated subspaces (S_1, S_2 e S_3) relativized to possible worlds taken as *indicatively actuals* (indicated by the white fills regarding each subspace: $[S_1 - w_1]$, $[S_2 - w_2]$, $[S_3 - w_3]$).
p: Woody originates from m''.

The general idea is to build a semantics in which the possible world structure is composed of *multiple isolated subspaces* of possible worlds instead of only one space of possible worlds. As can be noticed in Figure 3, there are three different subspaces to accommodate the intended relativization to *indicatively actual* possible worlds. Depending on which world is considered as indicatively actual, a different subspace comes into play and, therefore, different truth values are assigned to the proposition in question. If we think of the proposition p (Woody originates from m'') and take w_1 (where Woody is made from m) as indicatively actual (subspace S_1 represents it), then we will get the truth value *false* for p (and also for $\Diamond p$ and $\Diamond\Diamond p$) in

$w_{1(S_1)}$. However, if we assume that the indicatively actual world is the possible world w_2 (where Woody is made from m': subspace S_2 represents this situation), then, even though p will continue to be false (in $w_{2(S_2)}$), $\Diamond p$ (and also $\Diamond \Diamond p$) will turn out to be true in $w_{2(S_2)}$. Something similar happens if w_3 (where Woody is made from m'') is taken as indicatively actual. But in this case, p will be true in $w_{3(S_3)}$ (the same goes for $\Diamond \Diamond p$ and $\Diamond p$ regardless whether or not p is true in either $w_{1(S_3)}$ or $w_{2(S_3)}$).

It is worth noting that the only difference between each world-token (for instance, w_1 at the subspace S_1 and w_1 at subspace S_2), regards the relativization in place, i.e. which world is considered as indicatively actual. As it has shown, some true propositions concerning one relativization might come out false to another. That is precisely the intended result.

This section began by talking about Murray and Wilson motivations for proposing an alternative interpretation for relativized metaphysical modality, which, as we now can see, are two primary motivations: first, to recognise Wood's data as philosophically relevant; and second, to provide a solution to Woody's case compatible with the **S5** modal logic system. Did they satisfy these motivations? It seems that they did meet them. They accept the significance of Woody's case and propose a "new" semantics for the interpretation of modality, which allows us to deal with Wood's case and, in the meantime, preserve **S5** features. If we look at Figure 3 once again, we will see that, concerning each isolated subspace, the accessibility relation between possible worlds meets the **S5** requirements, i.e. it is a transitive, symmetrical and reflexive binary relation. To be able to do that, what they did was to propose a semantics in which the truth value of a given proposition is relativized to which world is being held as indicatively actual. Even though Figure 3 gives us

a gentle visual grasp of their approach, we still need a
precise formulation of it. To get an accurate formula-
tion, we can compare the formal features of their se-
mantics with the standard semantics for propositional
modal logic.As I said above, Murray and Wilson's se-
mantics increments the standard semantics for modal
logic with an additional parameter. The semantics for
modal logic is usually presented with a triple $\langle W, R, v \rangle$,
where W stands for the set of possible worlds, R rep-
resents the accessibility relation that ranges over W,
and v is a function which assigns truth values to each
proposition regarding each possible world. Just as a
reminder, the clause for evaluation of a proposition
like $\Box p$ is what follows:

> $v(\Box p, w) = \mathrm{T}$ *iff* for *every* world w' in W
> such that wRw', $v(p, w') = \mathrm{T}$.

Murray and Wilson's semantics adds a new parame-
ter to the semantic structure in such a way that it be-
comes a quadruple $\langle W, R, v, w_@ \rangle$. This quadruple adds
a function $w_@$, which picks out one possible world of
the set W to be considered as indicatively actual (any-
thing else is kept equal). The new semantic clause for
necessity becomes:

> $v(\Box p, w, w_@) = \mathrm{T}$ *iff* taking w as $w@$, for
> *every* world w' in W such that wRw', $v(p, w')$
> $= \mathrm{T}$.

Or, more naturally,

> $\Box p$ is true$_{w1}$ *iff* taking w_1 as indivative ac-
> tual, p is true in every possible world ac-
> cessible from w_1.

As it may have been noticed, there is no constraint
whatsoever on R. R does indeed represent a reflexive,

symmetrical and transitive relation. Hence, Murray and Wilson's semantics does indeed validate **S5**. However, one may ask, does it handle Woody's data properly? Let us think about that. The general strategy of dealing with Woody's data uses the relativization as a function from indicatively actual worlds to truth values, which means that depending on which world is the indicative actual, different truth values come out.

As it happens in the case of subspace S_1, the world-type w_1 is the indicative actual (w_1 is possible relative to any other possible world in S_1; as **S5** requires). In S_1 where w_1 is the indicative actual world, and Woody originates from m, the proposition $\Diamond p$ turns out to be false (in $w_{1(S_1)}$). It happens because the proposition p is false in all possible worlds (in S_1) (including w_3 where, let us say, a table other than Woody originates from m''). Since **S5** is in place (thus, the accessibility relation is an equivalence relation), we can extrapolate and say that not only $\Diamond p$ is false but also $\Diamond\Diamond p$ (in $w_{1(S_1)}$). Considering the subspace S_2 (where w_2 is the indicative actual world, and Woody originates from m'), the proposition $\Diamond p$ comes out true (in $w_{2(S_2)}$). In this case, the table of $w_{3(S_2)}$ that originates from m'' is Woody itself, which means (given that **S5** is in place) that not only $\Diamond p$ is true but also $\Box\Diamond p$ is true (in $w_{2(S_2)}$). In both cases, in the subspace S_1 and in the subspace S_2, the **S5** modal logic system is validated. Either it is impossible to Woody originates from m'', then it is necessarily so (as in S_1). Or it is possible for Woody originates from m'', then it is necessarily so (as in S_2). Either way, **S5** is preserved.

Based on all we have discussed so far, we should (at least for the sake of argument) grant that Murray and Wilson have satisfied their motivations of making sense of the idea of preserving **S5** and, at the same time, dealing with Woody's data. From the next section onwards, I argue that despite Murray and Wilson's make

sense of their goals, their approach faces both technical difficulties and philosophical challenges that might give us reasons to stick with the S5-denying approach to relativized metaphysical modality, if we are willing to understand modality in a relativized fashion.

4 Challenges for the 2D-interpretation of Relativized Modality

In the second half of this paper, I will be presenting some problems that the 2D-interpretation of the relativized modality has to face. The potential problems will be of two kinds: i) I will argue that such an approach may have trouble trying to make sense of the concepts used to formulate the theory and also that the possible world structure used in the account may not be able to represent modality accurately. And ii) 2D-interpretation may face serious challenges dealing with the philosophical problems that it was initially designed to address. It is worth noting that neither the first nor the second kind of challenges can undermine the original project; that is not even the aim of this section. In fact, this section aims to argue that if one wants to understand the relativized of modality accurately, the S5-denying approach is probably his most conservative option.

4.1 Extensional Inadequacy

The 2D-interpretation is supposed to be a theory of modality based on a type of possible worlds semantics. As such, it also aims to represent possibilities (necessities, and other potentially derived modal concepts, e.g., essence) in terms of a possible worlds structure. This section argues that 2D-interpretation may not be able to represent the modal discourse. I will argue that the 2D-interpretation provides an extensionally inadequate description of modality. On the

one hand, it does not represent some possibilities that it should be able to represent. On the other hand, it acknowledges too many possible worlds: there are more possible worlds than there should be.

4.1.1 Too Many Possibilities to Handle

The strategy is to show that some general features of the underlying concept of possible worlds used to build the semantic structure of the 2D-interpretation prevents it to represent all the facts (or propositions, state of affairs, etc.) that it was supposed to represent. Therefore, the notion of possible world employed does not, in fact, represent the concept of possible world (as usually understood).

The inspiration for what follows is David Kaplan's challenge for the foundation of possible worlds semantics, which Kaplan relates to Russell's paradox. Kaplan argues for a paradox that shows up in possible world semantics. As he puts it, the challenge "shows a serious difficulty in the naive foundation of PwS [possible world semantics]." (Kaplan, 1995, p. 41). As it would be expected, there are many different versions of the argument for many different purposes. What follows is a simplified version of Kaplan's case for the purposes this paper.[5]

The argument aims to show that there cannot be entities such as possible worlds or any other kind of representation of the set of *all* the propositions (facts, states of affairs, etc.). To be more precise, the problem in question here relates to the notion of *maximality*. In general, the idea is that for any supposed arrangement of all propositions that one considers, there will always be some propositions left out. The argument attacks

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[5]For a more detailed and precise discussion about the case, I would suggest both Kaplan's paper (1995) and the section on possible worlds paradoxes in John Divers' *Possible Worlds* (2002).

the notion of *maximal consistent sets* of propositions arguing for the incoherence of such a concept. Since possible worlds, under some perspectives, are characterised as maximal consistent sets of propositions, an argument demonstrating the inconsistency of that concept will also show the inconsistency of the concept of possible worlds so described. The notion of a maximal set of propositions is characterised as follows:[6]

> S is a *maximal* set of propositions *iff* for any proposition p, either p or its negation is a member of S.

To make sense of the idea, let us begin to suppose possible world w and a proposition p which represents the conjunction of all true propositions concerning w. The problem shows up when a proposition refers to p. For example, let us think about a person A and a future time t, and suppose that it is possible that A thinks of p at t. At this point, the reader may have already figured out the strategy. Suppose that q is the proposition that represents the possibility just described. The problem, then, is that q cannot be part of p. Nevertheless, p was supposed to represent all the propositions. Therefore, we conclude either p did not represent all the propositions in the first place or propositions such as q cannot constitute a genuine proposition. Since there is no reasonable ground (at least in the naive foundation of PwS) to argue that q does not represent a real proposition, one should conclude that p does not represent all the propositions. This conclusion extrapolates for any representation of all propositions. And that should be enough for us to reach a contradiction, given that we began for supposing that p does

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[6]It does not need to be about sets of propositions. In fact, many philosophers understand the concept of possible worlds differently. What matters is whether the concept employed uses or not the notions of (naive) sets and maximality. If that is the case, then the argument is going to follow regardless.

represent all propositions. Hence, the additional sup-
position that a possible world is defined as *a maximal
set of propositions* will allow us to conclude that w is
not a possible world.

As might be clear, this kind of argument will be, as
far as I can see, an issue for any treatment of modality
which uses possible worlds understood as *a maximal
set of propositions* (or some other favoured notion). In
fact, the problem will potentially arise for any attempt
of providing a semantics for modality which uses naive
set theory as the base on the top of which the modal
semantic is built and tries to give a coherent notion
of maximal consist set, which supposedly would rep-
resent all propositions. So, this particular argument
is not an issue specifically to the 2D-interpretation.
However, as I said before, inspired by the argument
just discussed, we can make a case for a problem that
the 2D-interpretation of relativized modality will need
to face. That is what we are going to do now.

It is not complicated to come up with an example
that shows up only in the 2D-interpretation. One of
these cases considers the proposition:

p: Woody$_{w1_{(S_1)}}$ is identical to Woody$_{w1_{(S_2)}}$.

Just to remember, S_1 and S_2 refers to different sub-
spaces in the 2D semantic structure. What is the prob-
lem with p? There are a couple of issues regarding p.
The first of them being: is p a member of either $w_{1(S_1)}$
or $w_{1(S_2)}$? In fact, there seem to be reasons to think
that p is neither a member of $w_{1(S_1)}$ nor $w_{1(S_2)}$. Based
on what we have seen so far and considering the con-
cept of possible world used in the semantics proposed
by the 2D-interpretation is indeed the familiar concept
of possible world, if p is not a member of $w_{1(S_1)}$, then
$not-p$ should be. However, for precisely the same rea-
sons that p is not a member of $w_{1(S_1)}$, $not-p$ cannot
be a member of $w_{1(S_1)}$ as well. So, $w_{1(S_1)}$ is not *max-
imal*. Therefore, $w_{1(S_1)}$ is not a possible world. The

very same reasoning can be developed to show that $w_{1(S_2)}$ is also not a possible world. Extrapolating the result, we conclude that the concept of possible worlds used in the 2D-interpretation is not the familiar concept of possible worlds. This case is only an issue for the 2D-interpretation not for any standard semantics.

The last case presents, let's say, a more "technical" issue, but there are some other philosophical problems potentially even more complicated. One of the philosophical difficulties that I want to discuss here concerns the concept of identity showing up in p. A straightforward way of making the first problem evident is comparing it with an analogous case in the standard semantics.

p': Woody$_{w_1}$ identical to Woody$_{w_2}$.

What is the notion of *identity* in p'? The standard semantics can say that the notion of identity in issue is the notion of *transworld identity*; the ordinary notion of identity in the standard philosophical interpretation of the semantics for modal logic.

The 2D-theorist can only use transworld identity within each subspace, not outside. Outside of each subspace, one would have come up with something different such as *trans-subspace identity*. The problem with this notion is that it is a brand-new concept which nobody is familiar with and it is not explicitly defined. Additionally, it is not clear the role that such a concept would be playing in theory as a whole. Would it be used elsewhere, or it would just be postulated to make sense of p? Even though transworld identity is replaceable (for a *counterpart relation*, for instance), it still is a crucial notion in the standard semantics. Is trans-subspace identity also an important notion? I cannot see how. At least not without making 2D-interpretation, for many purposes, indistinguishable from standard approach.

I cannot say, however, that Murray and Wilson did not expect some related issues. As they say in the footnote 12:

> "Even though worlds in different subspaces are not identical on this view, worlds in different partitions may be taken to be 'basic' or 'canonical' counterparts of each other, [...] worlds in different spaces may be basically alike; such similarity may serve as the basis for loose (as opposed to strict) identification of worlds across subspaces. So, for example, distinct subspaces might each contain worlds that are basically, canonically, or qualitatively similar, in containing, e.g., a table-shaped hunk of matter m''; such worlds, we might say, are of type w_3. In a world of type w_3, is it true or false that Woody originates from m''? That depends. In a subspace where the indicatively actual world is (of type) w_1, this is false; but in a subspace where the indicatively actual world is (of type) w_2, this is true." (Murray & Wilson, 2012, p. 207)

Even though they did give some indication regarding the identity (or identification) of worlds across subspaces, they clearly avoided talking about the identity of objects across subspace. That's evidenced by the use of the indefinite article 'a' at 'a table-shaped [...]' instead of a proper name or even a definite description. I do not know whether they think that this is not important, or they are planning to give an account of the notion in the future, but, from my point of view, it is a crucial point of the theory and precision about it is fundamental to make sense of their approach.

Transworld identity plays a vital role in possible worlds semantics, as employed by the standard interpretation. In fact, transworld identity is what enables

the standard possible world semantics to represent, for instance, a modal concept of *essence* or to make sense of the notion of *de re* possibility. Transworld identity is precisely the function that maps objects in different possible worlds to answer questions about possibilities for a given object. In order to answer whether or not is possible for Woody to be originally made of m' (a piece of wood slightly different from the matter that Woody was actually made), we need be able to identify Woody in different possible worlds correctly. Without transworld identity, possible worlds semantics would not be suited to model metaphysical modality theories accurately.[7]

As it was said above, 2D-interpretation does not give a straight answer whether or not Woody could be originally made from m'. To answer questions about possibilities regarding Woody, we need first to pick out a subspace and then, depending on which subspace we end up selecting, the questions will be answered positively or negatively.[8] As long as the first stage of the evaluation (the picking out subspace stage) has been completed, the theory will need to guarantee that, in the end, we were talking about Woody itself and not any other 'table-shaped such and such'. To be adequate to provide an account to metaphysical modality and to make room for essentialism (or, more generally, to be able to answer questions about *de re* possibility), the 2D-interpretation of modality would need to give

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[7]As said before, transworld identity might be replaced in the semantic structure by some other function such as a counterpart relation to perform the role of mapping objects in different possible worlds. Being that the case, a precise definition of the logical proprieties of the function employed is going to be necessary. Whereas transworld identity is an *equivalence* relation, counterpart relation is usually intentionally *weaker* than that (intransitive, for instance). Regardless, the logical properties of the counterpart relation that one uses need to be made explicit.

[8]It is worth remembering that transworld identity within each subspace works just like in the 1D-semantic framework.

us precise procedures to evaluate modal claims. Those procedures would probably require some method to identify objects in different subspace in addition to the transworld identity, which would still play within each subspace. If that is correct, then the 2D-interpretation of relativized metaphysical modality needs to make sense of a concept of trans-subspace identity. Since they have not provided such a concept, we can try to figure out how it could work. Regarding the standard interpretation and also the S5-denying approach, transworld identity is defined as an equivalence relation.

As we have seen, the S5-denying approach takes advantage of the intransitivity in the accessibility relation between possible worlds to deal with Woody's case. One suggestion of a notion of a world's counterpart and similarity that can be seen in the following quotation:

> "Even though worlds in different subspaces are not identical on this view, worlds in different partitions may be taken to be 'basic' or 'canonical' counterparts of each other, [...] worlds in different spaces may be basically alike; such *similarity* may serve as the basis for loose (as opposed to strict) identification of worlds across subspaces." (Murray & Wilson, 2012, p. 207)[9]

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[9]This is unusual employment of the word 'counterpart', which usually refers to the attempt of placing *transitivity* elsewhere. 'Counterpart theories' typically refer to some strategy that changes the function which maps the objects in different possible worlds. The most natural of those strategies would be to weaken the mapping function making it *intransitive*. In that case, instead of transworld identity, a notion of counterpart (intentionally designed to behave as a intransitive concept) would play the role of picking out the objects in different possible worlds. David Lewis (1986) has famously followed that path for reasons independent of the present discussion.

If taken seriously, the last quotation suggests that Murray and Wilson might prefer to place a sort of *intransitivity* on the concept of trans-subspace identity. Being that the case, they could say that a far way subspace where 'a table shaped such and such' exist and is sufficiently different from Woody is not Woody anymore.

Another way to achieve similar results would implement a supplementary notion of accessibility relation between subspaces. Case in which, a subspace where Woody is sufficiently different for some reason does not exist or is not a possible being. At this point, we seem to be either coming up with semi-technical *ad hoc* solutions or making the 2D-interpretation more and more similar to the S5-denying approach. Either way, it does not help 2D-interpretaion.

There is one more point that a 2D-theorist can make, though. He could simply argue that he does not need a notion of trans-subspace identity at all. In that case, I would answer saying that 2D-interpretation no longer make room for *essentialism.* As a matter of fact, one would be embracing a radical *anti-essentialism* since there would not be any restriction on the way how things could have been in different subspaces. Once again, a quite strange result considering that the 2D-interpretation was motivated in the first place, among other things, by the wish of accommodating Woody's data.

4.1.2   Too Many Possible Worlds

In the latest section, I argued to demonstrate that the semantic structure provided by the 2D-interpretation of relativized modality is not extensionally adequate because it does not represent all the possibilities. Nevertheless, we can also argue in the opposite direction demonstrating its extensional inadequacy by showing that its semantic structure represents things that are not possibilities. The semantics is designed in such a

way that there will often be more than only one pos-
sible world to represent each possibility.

The general idea of 'extensional adequacy' that I am
using here is that the semantic structure used to rep-
resent modality should hold an *isomorphic one-to-one
relation* with the modal concepts which it is supposed
to represent (in the current case, the modal concept
of possibility). That is to say that for each possibil-
ity (regarding the kind the modality in issue; in this
case: metaphysical modality), there must be one, and
only one, corresponding possible world.[10] Arguably,
that is the case considering both the standard interpre-
tation of modality and also the S5-denying approach
to relativized modality. However, concerning the 2D-
interpretation things seem to be quite different.

Understanding possible worlds as maximal consis-
tent sets of propositions (or something similar), the
isomorphic relation can be quite straightforwardly demon-

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[10]That is is strictly speaking false. In fact, for any possibility
P, there will be a family of possible worlds. For sake of simpli-
fication, let us consider only two possibilities: suppose that P
stand for the possibility of myself being an alien and Q represent
the possibility of the snow being white. Technically, regarding
P (and supposing that the possible worlds are composed of only
two possibilities (P and Q)), there will be two possible worlds
corresponding to the possibility P: the world where snow is
white and the world where it is not white. To properly speak of
the one-to-one relation between possible worlds and possibilities,
we should talk about the notion of a family of possible worlds
instead of merely possible world. To get the one-to-one relation
from the idea of family of possible worlds, what we need to do
is arbitrarily keep all the other possibilities stable (unchanged).
For example, if we keep Q stable (snow is white), there will be
only one possible world for corresponding to P. The complexity
grows really fast (2^n, in semantics with only two truth values)
according to the number of possibilities in consideration. So,
for the sake of simplicity, I will continue using 'possible worlds'
instead of 'family of possible worlds, supposing that these con-
siderations have made things clear. Even if these clarifications
are not persuasive enough, I hope they will help to see that
2D-interpretation overgenerates possible worlds.

strated.

> w is a possible world *iff* for any proposition
> p, either p or its negation is a member of
> w.

Let us suppose that w represents the possibility P in the semantic theory. The substitution of propositions that are members of w by their respective negations gives us a brand-new possible world w^* which represents an also brand-new possibility P^*. Despite being quite straightforward, this reasoning allows us to show that a concept of possible worlds characterised as above, holds the isomorphic relation with the modal concept of possibility, making it suited to play the role of representing the modal concepts. Analogous reasoning, though, cannot be pursued if one adopts the 2D-interpretation of relativized modality. At least in some context (namely, those in which a relativized approach is arguably well suited (e.g., Woody's case)), the one-to-one isomorphic relation between possibility and possible worlds cannot be established. In reality, regarding each possibility, there will be countless corresponding possible worlds.

One willing to defend 2D-interpretation of relativized modality could argue that even though the semantics cannot establish a one-to-one relation between possible worlds/possibility, it can establish a one-to-one relationship between possible world-type and possibility.

I recognise that approach as the correct way to go, but I still waiting for a precise explanation of why we need possible world-type instead of the "simple" possible world concept. And, what seems to be even more complicated, we need a clear explanation of what is precisely the relationship between those two concepts – possible world and possible world-type. They are somehow related, even though it is not obvious how and it is also not clear if it still makes sense to refer to possible world-type by the expression 'possible world'.

Strictly speaking, possible world, as used in formal semantics, can be virtually anything. But the question is that, when applied to philosophical theories, possible worlds need to correspond to some relevant philosophical concept which they are supposed to clarify. Otherwise, instead of making philosophical theories more precise and easier to work with, the notion of possible worlds will end up making them more obscure and harder to grasp. I do not want to argue that that is the case with the 2D-interpretation (I would not go that far). However, I do believe that the precise relationship between possibility and possible world-type still needs to be made explicit. If it is not a one-to-one isomorphic relation, then what is it? As far as I understand, this question remains unanswered. What I take as a downside of the proposal.

4.2 2D-interpretation and Essentialism

As we have seen in the first part of this paper, the 2D-interpretation of relativized modality was motivated by, among other things, the ambition to accommodate Woody's data in a reasonable understanding of metaphysical modality. Woody's case shows up in a specific theory of what is possible or not for an object, in this case, Woody. The consideration of something impossible for an object is often called 'essentialism'. An essentialist is going to say that, for instance, Woody could not have been made from m''. That is the same as saying that it is impossible to Woody to be (originally) made of m''. What this does is to impose restrictions on the possibilities available for Woody. Some essentialists are willing to hold a modal principle that states that, even though Woody could not have been made from m'', it could have been made from m', supposing that Woody was actually made from m. As said before, one of the main the motivations for 2D-interpretation is to accommodate essentialist cases like

Woody's within a theory that does not drop **S5** modal logic system. The question now is: can they really do what they intend? Can they provide such theory? Can their theory impose restrictions on what is possible or not for Woody? It does not look like they can. Let us see why.

How does S5-denying approach handle Woody's case? Well, the explanation is quite straightforward. Supposing that Woody was actually made from m, it is not possible for it to be made from m''. And why is that so? The general idea is that there is a threshold according to which, if the amount of the overlapping matter used in the manufacturing process of making Woody is smaller than x, then the table which eventually comes out of this process cannot be Woody. This very idea is reflected in the S5-denying formal treatment of modality by restriction of the accessibility relationship between possible worlds. Since the S5-denying approach understands metaphysical modality in such a way, the corresponding modal logic will recognise any world which represents a situation in which the threshold condition is not satisfied as representing an impossibility for Woody. Hence, the S5-denying approach accommodates the case. In fact, it is designed having Woody's case in mind. What about 2D-interpretation? It seems to understand things slightly different. The question of whether or not Woody could have been made from m'' does not have a straight answer. It appears that the question involves some ambiguity that needs to be sorted out before the theory can answer. The response is going to depend on which subspace is in question or, in other words, which possible world is being held as indicatively actual. If we take the possible world w_1 as indicatively actual (take a look at the Figure 3 again), then the answer is 'no', Woody could not have been made from m''. However, if we take either the w_2 or w_3 as indicatively actual relativizing the

answer to either subspace S_2 or S_3, then the answer is going to be 'yes', Woody could have been made from m''.

My main concern with the account is that it looks like there is no limiting case. There is no threshold to restrict how different the world that is being taken as indicatively actual can be. In reality, there is nothing in the theory preventing us from taking as indicatively actual a world substantively different from the actual world. Let me give an example. Suppose a world (w_n) so dramatically different from the actual world that is a possibility for Woody to be made of iron instead of wood. As far as I understand it, 2D-interpretation does not offer any tool that could rule out that possibility. In fact, 2D-interpretation cannot prevent us from taking w_n as indicatively actual. That seems to show that 2D-interpretation does not accommodate essentialism since the essentialist is going to want to say that w_n does not represent a genuine possibility for Woody: w_n is not a metaphysically possible world. Since 2D-interpretation does not rule out cases such as just described, it does not seem to be well suited for to be considered a theory for essentialist relativized metaphysical modality. And that is for me an entirely strange conclusion because it looked like it had been designed to handle Woody's data recognising it as a crucial limiting case of metaphysical modality. Furthermore, we seem to be able to conclude, following the principles of the theory itself, that there should not be an essentialist restriction on what is possible for Woody. I take that as tension within the proposal that at least requires further clarification.

5 Is 2D-interpretation a Conciliatory Theory?

The last objection that I want to present is addressed to Murray and Wilson's intention to provide a concil-

iatory theory for relativized modality. Their theory intends to be conciliatory in a few different ways. In this section, I will focus on one that I suppose to be the most relevant for the purposes of this paper: the attempt to make 2D-interpretation an S5-friendly theory. The idea is that the 2D-approach can give a decent treatment of Woody's data within an **S5** modal logic framework. I argue that even if they provided an S5-friendly theory, I do not believe that any firm **S5** supporter such as Plantinga or Williamson would consider adopting it.

My point here is straightforward: among the few arguments available in the literature supporting **S5** modal logic (for metaphysical modality), none of them seems to be supporting 2D-interpretation. Let us consider, for example, the case of Plantinga and think about the quotation of *The Nature of Necessity* given at the beginning of this paper. Among other things, he says, and I quote:

> "[i] Are there propositions that in fact are possible, but would have been impossible had things been different in some way? [ii] [C]ould [they] have been impossible? The answer, I think, is clear; [they] could not have been impossible." (Plantinga, 1974, p. 52)

Suppose that the proposition p (Woody is made of m'') is considered impossible. Assuming we accept Plantinga's argument, we will be compelled to accept that p could not be possible. It seems to be clear that this is a problem for those who do not want to admit **S5** modal logic (for metaphysical modality). However, one may ask, is the situation any better for those who think that p would be possible if another world had been taken as indicatively actual? All they are doing is saying that p is impossible relatively to some worlds taken as indicatively actual but not to others. Would

that be enough to persuade Plantinga to accept 2D-interpretation? The only way to know is asking for him. Until then, I bet he would not be willing to accept 2D-interpretation. As far as it goes, I understand that if Plantinga's argument works against S5-deniers (which by the reasons given in the first part of this paper, I do not think it does), then it will work for similar reasons against the 2D-interpretation.

David Lewis gave one more argument in the same direction in his *On Plurality of Worlds*. Let us look into it:

> "In these questions of *haecceitism* and *essence*, by what right do we ignore worlds that are deemed inaccessible? Accessible or not, they're still worlds. We still believe in them. Why don't they count?" (Lewis, 1986, p. 246)

David Lewis is precisely discussing issues related to Woody's case in that quotation. And he puts forward an argument quite similar to the one presented in the first part of this paper to support the non-relativized approach. The general idea is the same as Plantinga's. If metaphysical modality is the one being taken into consideration, there will not be a world that is not accessible from the actual world. The point here is to show that metaphysical modality must validate **S5** modal logic, even if one is willing to accept a weaker system to a restricted notion of modality, such as nomological or physical.

Supposing that Lewis' argument supporting the non-relativized approach is convincing, is the 2D-theorist in a better position in comparison to its S5-denying opponent? I think that if Lewis' argument is convincing against the later, then it is also convincing against the former. From the S5-denying perspective, the proposition p – Woody is originally made of m'' – is not possible regarding the actual world, which means that

a world representing such a possibility (w_3) is considered an impossible (inaccessible) world (from the perspective of the actual world), which does not preclude w_3 of being possible from some other possible world. Here comes the rhetorical appeal of Lewis' quotation – "Accessible or not, they're still worlds. We still believe in them. Why don't they count?". Lewis is pushing to the idea according to which if we recognise w_3 as a world, we should recognise it as possible (accessible) from any possible world; against S5-denying approach. The question now is that supposing that the rhetorical appeal of Lewis quotation against S5-deniers has convinced you, would you still be in a position to accept the 2D-interpretation workaround? In the end, what they are doing is saying that p is possible regarding some isolated subspaces but not others. Why should we grant that there are such thing as isolated subspaces? One may ask adapting Lewis' idea. Once they are there, why should we concede that they are isolated? I think no answer to this question can be more plausible than a similar explanation given by an S5-denier.

In this respect, I think that the 2D-interpretation is in a position at least as complicated as the S5-denier. Worse for the 2D-theorist who motivated his approach promising an S5-friendly theory. It might be a compatible theory, but is it any attractive to a supporter of the standard interpretation? I do not think so.

In a more general perspective, it is a well-known fact that **S5** modal logic system is compatible with isolated subspaces of possible worlds; each of them being modelled by a semantic structure which employs an equivalence relation on the accessibility relation among possible worlds. However, I think, the appeal of what Lewis and Plantinga say is not only that any possible world must be accessible to all the other possible worlds in a given subspace (compatible with **S5**), but

also that that subspace is the *total* universe of possible
worlds (what **S5** does not offer). In this case, the acces-
sibility relation between possible worlds is called 'to-
tal', which means that for any possible world one picks
out, this possible world will be accessible to any other
possible world that exists (no qualification needed).
The requirement for accessibility relationship between
possible worlds to be total is stronger than what **S5**
can deliver, and then a theory as strong as **S5** modal
logic cannot meet the technical demands. Therefore,
even if the 2D-interpretation does manage to accom-
modate Woody's data within an **S5** framework, it still
unable to deliver a notion of accessibility relation be-
tween possible worlds characterised as a total. In the
best-case scenario, the accessibility relation between
possible worlds in the 2D-interpretation is an equiva-
lence relation, but it cannot be a total relation. To be
honest, I think that only because no one had thought
of something to make sense of isolated subspace that
people have not realised yet what they want is a to-
tal relation instead of an equivalence relation. Now
that Murray and Wilson have come up with the 2D-
interpretation, people will need to be clear about that.
And that's a good thing.

5 References

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